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Evaluation Test
of a
Modification Kit
for the
AN/AVQ-2A Aircraft Searchlight

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I. Introduction

In the course of operational experience with the AN/AVQ-2A aircraft searchlight it was found that malfunction of the thermo-optical focus control system was a relatively frequent cause of failure of the searchlight. Accordingly, the National Bureau of Standards, at the request of BuAer, undertook to develop an improved focus control method. Several kits, consisting basically of an "obturator-probe" device, but including as well several other improved components, were furnished to the fleet for evaluation along with NBS Report 1354 "Instruction Book for the Modification of the AVQ-2A Aircraft Searchlight". The fleet evaluation tests were generally successful. The results of the fleet evaluation as well as additional data obtained at NBS were examined carefully and final designs for a modification kit were issued in NBS Report 3156, "Construction Details for NBS Modification of AN/AVQ-2A Aircraft Searchlight".

This report gives the results of evaluation tests of a pre-production modification kit, based on the one designed at NBS, and manufactured by the Strong Electric Corporation.

II. Material Tested

One pre-production modification kit furnished by the Strong Electric Corporation under Contract No. NOas 54-887-f was received for test in September, 1954.

III. Test Procedure

The modification kit was installed on a new AVQ-2A searchlight, and checked for conformity with the design details given in NBS Report 3156.

The modification kit was installed according to the instructions given in NBS Report No. 1354. Each part was carefully checked for ease of mounting on the searchlight unit. The modified searchlight was operated for a life test of 100 hours, consisting of a duty cycle of one minute on and four minutes off. The operation of the arc was constantly checked and data of its performance obtained throughout the 100-hour life test.

IV. Test Results

The parts of the modification kit were packaged and labeled in individual packages. They were free of tool marks and their appearance

was good.

The AVQ-2A searchlight, modified with the kit provided, operated satisfactorily. The following discrepancies in the construction of parts of the kit were noted: (Part designations are those given in NBS Report No. 3156).

1) The filister screws (part No. 18) provided to fasten the douser to the douser slider arm had heads which were too long and had to be replaced with screws with shorter heads in order that they would not strike the negative head support rod clamp. The three screws furnished were all of the same length, 7/16", instead of two 3/8" long and one 5/8" long screws as were furnished in the original kit. This feature reduces the number of different spare parts required for maintenance of the kit. The negative head support rod clamp that is located near the douser had been filed on one side so as to permit clearance for the douser mounting screws. However in order to facilitate assembly and allow for interchangeability of parts, the use of the proper size filister head screws and interchangeable support rod clamps is advisable.

2) Both lava and "Mycalex" insulating washers were provided and tried on the equipment; the "Mycalex" washers proved to be less fragile and more suitable for this application.

3) The slot in the contact brush (part No. 28) designed to fit over the positive drive shaft did not fit exactly on the shaft. This did not, however, interfere with the normal functioning of the searchlight.

4) For fastening to the douser slider arm, the douser has an integrally cast slotted bracket which saddles and clamps the douser slider arm. In the original NBS douser design, the mounting screw holes drilled through the part of the bracket which fits on the outside of the douser arm were not tapped, so that as the mounting screws were tightened the saddle of the bracket would clamp the douser arm. In the douser manufactured by the Strong Electric Corporation, the holes in the outside of the bracket were tapped, preventing the proper clamping action of the douser bracket to the douser arm. (For this test the holes in the bracket were drilled out and installed on the douser arm in accordance with the original design.)

5) The spring provided to return the douser after the arc has been struck (part No. 56) was not strong enough and the douser remained retracted occasionally. The spring was replaced with a stiffer one such as was used in the original NBS modification kit. Occasional malfunction of the douser mechanism was averted by proper lubrication of sliding parts with a special arc mechanism lubricant supplied by the Strong Electric Corporation. If a lubricant is used, the mechanism should be cleaned and relubricated each time the searchlight is serviced.

V. Discussion

The AVQ-2A searchlight equipped with the modification kit manufactured by the Strong Electric Corporation operated satisfactorily for the duration of the 100-hour life test after it was corrected as outlined in "Test Results".

During periods of poor arc operation such as when the current is abnormally high, black deposits may form on the controlling edge of the obturator, directly above the positive carbon. These should be removed after each flight as they may reduce the accuracy of focal control of the arc. In extreme cases, if the deposits are not cleaned off for some time they may build up sufficiently to cause serious malfunction of the arc. To minimize the formation of deposits on the controlling edge of the obturator-probe, the cause for any arc misbehavior should be determined and corrected if possible.

During normal arc operation, the upper half of the obturator-probe facing the arc may become coated with an ash or powder deposit and the entire obturator-probe will be oxidized; this does not interfere with the normal operation of the arc.

